Amendments to the Specification:

Please replace the paragraph beginning on page 2, line 2 with the following amended paragraph:

C1

Backout may damage internal tissue structures and cause complications if the dislocated fastener penetrates the tissue structures. For example, if backout occurs, the fastener might breach the esophageal wall of the patient. Such a breach may permit bacterial contamination of surrounding tissues, including ~~the~~ critical nerves in and around the spinal cord. Such a breach could be fatal.

Please replace the paragraph beginning on page 4, line 19 with the following amended paragraph:

C2

Midline holes may be formed through the plate at various locations along a midline axis extending across the plate. The surface of the plate that surrounds each midline hole may be tapered. Further, the heads of fasteners that may be positioned within the plates may have tapered outer surfaces that generally correspond to the tapered surface of the plate. Thus, when such a fastener head is inserted into a midline hole, the shape of the plate causes the fastener to become fixably attached to the plate in a position that is substantially perpendicular to the plate. Midline holes may be used to attach a bone graft to the ~~bore~~ bone plate. Oblique angulation of fasteners positioned within the midline holes may not be required.

Please replace the paragraph beginning on page 7, line 15 with the following amended paragraph:

C3

~~Further advantages~~ Advantages of the present invention will become apparent to those skilled in the art with the benefit of the following detailed description of embodiments and upon reference to the accompanying drawings in which:

Please replace the paragraph beginning on page 9, line 20 with the following amended paragraph:

C4

Referring to the drawings, and particularly to Figure 1, a spinal plating system is designated generally as 20. The spinal plating system 20 may be used to correct problems in the lumbar and cervical portions of the spine. For example, the spinal plating system 20 may be implanted into the occiput bone that is located at the base of the skull. The spinal plating system 20 may also be installed anterior to the spine. The spinal plating system 20 includes plate 22 that is placed adjacent to a portion of the spine and spans at least two vertebrae. Plate 22 may include four end holes 24, located at corners of the plate. End holes 24 pass vertically through plate 22 such that the holes extend from an upper surface 26 to a lower surface 28 of the plate as depicted in Figure 2. End holes 24 are configured to receive rings 30. Fasteners 32 fit within the rings 30. Herein, "fastener" means any elongated member, threaded or non-threaded, which is securable within a bone. Fasteners include, but are not limited to screws, nails, rivets, trocars, pins, and barbs. The fastener may be a bone screw. Rings 30 fixedly attach fastener heads 34 of fasteners 32 to plate 22. Gap 36 may exist in each of the rings 30. A gap 36 allows for expansion and contraction of a ring 30. Ring contraction allows a ring 30 to be easily inserted into an end hole 24 of the plate 22.

Please replace the two paragraphs beginning on page 11, line 3 with the following amended paragraphs:

C5

Figure 3 depicts a cross-sectional view of an embodiment of a ~~final~~ spinal plating system ~~10~~ 20 wherein a pair of fasteners 32 are in a converging configuration. Figure 4 depicts a cross-sectional view of an embodiment of a spinal plating system wherein a pair of fasteners 32 are in a diverging configuration. Ring 30 fits into a hole 24 between plate 22 and fastener head 34. Inner surfaces 46 of holes 24 may have arcuate or spherical contours. Outside surfaces 48 of rings 30 may have arcuate or spherical contours that substantially correspond to the contours of the inner surfaces 46 of the holes 24. Having a contoured ring outer surface 48 that substantially

C5

corresponds to the contour of the inner hole surface 46 allows a ring 30 positioned in ~~a~~ an end hole 24 to be capable of polyaxial rotation within the end hole ~~24~~.

The combination of ring 30 within end hole 24 functions like a ball and socket since the ring may be swiveled or polyaxially rotated within the end hole. The ability of the ring 30 to rotate polyaxially within the end hole 24 allows a fastener 32 to be positioned through the plate 22 at various angles with respect to an axis that is perpendicular to the plate. Figure 3 and 4 show angle A for particular fastener configurations. The angle A is defined between the longitudinal axis 50 of the fastener 32 and imaginary axis 52 that is perpendicular to the plate 22. The angle A may range from 0 to about 45 degrees, preferably from about 0 to about 30 degrees, and more preferably from 0 to about ~~0 and~~ 15 degrees.

Please replace the five paragraphs beginning on page 12, line 20 with the following amended paragraphs:

C6

Ring 30 may be capable of swiveling within ~~a~~ an end hole 24 so that one portion of ring 30 is adjacent to the upper surface 26 of bone plate 22 while another portion of the ring lies adjacent to the lower surface 28 of the bone plate. In one embodiment, ring 30 may sufficiently thin to reside within end hole 24 without extending beyond the upper or lower surface 26, 28 of bone plate 22. The ring 30 and fastener head 34 remain within end hole 24 so that the spinal plating system 20 may have a minimal profile width. Having rings 30 and the fastener heads 34 which do not extend above the upper surface 26 or below the lower surface 28 of plate 22 may prevent the rings and heads from contacting adjacent tissue structures. In other embodiments, however, fasteners 32 may be capable of being angulated relative to bone plate 22 such that the rings 30 extend from the end holes 24 beyond upper and/or lower surfaces of the bone plate.

In one embodiment, the spinal plating system 20 is prepared for surgical implantation by positioning rings 30 within end holes 24. During the surgical procedure, holes may be drilled and tapped into the bones to which plate 22 is to be attached. Plate 22 may ~~then~~ be positioned adjacent to the bones and over the holes in the bone. Fasteners 32 may be placed through a ring

30 and into the bone holes. Each fastener 32 may be obliquely angulated into the plate 22. The fasteners 32 may be inserted into the bone until the fastener heads 34 expand the rings 30 against the inner surfaces 46 of the end holes 24; thus fixing the fasteners to the rings, and the rings to the plate 22. If necessary, a fastener 42 may be positioned in one of the central holes 38.

In one embodiment, ring 30 has an outer width that is less than or about equal to the width of an end hole 24 in bone plate 22 at a location between an upper surface 26 and lower surface 28 of the bone plate. The width of each end hole 24 proximate the upper and lower surfaces 26, 28 of bone plate 22 is less than or about equal to an outer width of ring 30. The width of the ring may inhibit a ring positioned in ~~a~~ an end hole from falling out of the hole. Prior to surgery, a ring 30 may be positioned within each end hole 24 of bone plate 22. When seated within end hole 24, ring 30 may be capable of swiveling within the hole, but the ring is inhibited from falling out of the hole because of reduced width of the hole proximate the upper and lower surfaces 26, 28 of the plate 22. ~~A surgeon may use a bone plate 22 having rings 30 positioned within holes 24 prior to surgery.~~ Alternatively, rings 30 may be manually positioned within end holes 24 during surgery.

Texturing the outer surface 48 of a ring 30 or an inner surface 46 of ~~a~~ an end hole 24 may further inhibit movement of a fastener 32 with respect to a bone plate 22. Both surfaces may be textured to more effectively inhibit movement of a fastener 32 with respect to a bone plate 22. During manufacturing procedures, the outer surface 48 of ring 30 and the inner surface ~~of~~ defining end hole 24 are formed as relatively smooth surfaces. While the friction between these smooth surfaces tends to be sufficient to maintain fastener 32 in a fixed position with respect to plate 22; under stressful conditions ring 30 may rotate within hole 24. By providing at least one textured surface, the coefficient of friction between the surface defining end hole 24 and ring 30 is increased. The increase in friction between the surface defining end hole 24 and ring 30 may help to inhibit fastener movement relative to plate 22.

Several types of textured surfaces may be used to increase the coefficient of friction between ring 30 and a surface defining end hole 24. In general, any process that transforms a

relatively smooth surface into a textured surface having an increased coefficient of friction may be used. Methods for forming a textured surface include, but are not limited to: sanding, forming grooves within a surface, shot peening processes, electric discharge processes, and embedding of hard particles within a surface.

C6

Please replace the paragraph beginning on page 15, line 10 with the following amended paragraph:

Any of the above methods of texturing may be used in combination with another method. For example, the inner surface 46 of end hole 24 may be textured using a pattern of grooves. The outer surface 48 of ring 30, however, may be textured using an electrical discharge method. When coupled together the textured inner surface~~surfaces~~ of end hole 24 and ring 30 may interact with each other to provide additional resistance to movement of the ring within the hole.

C7

Please replace the paragraph beginning on page 16, line 1 with the following amended paragraph:

Figure 9 illustrates a locking mechanism 116 used with fastener 100. Locking mechanism 116 includes top 122 with shafts 124 extending downwards and outwards from the top. Prongs 126 are located at ends of shafts 124. Prongs 126 may be substantially parallel to each other and also may be substantially parallel to the locking mechanism top 122. The shafts 124 have a spring-like action which allows the shafts ~~124~~ to be compressed. The spring-like action also allows the shafts to return to an original configuration when not compressed.

C8

Please replace the three paragraphs beginning on page 18, line 1 with the following amended paragraphs:

C9

After insertion of a fastener 100 and locking mechanism 116 into a bone, if the fastener ~~100~~ becomes loose within the bone, fastener backout from the bone plate may be resisted by the locking mechanism-groove connection between locking mechanism 116 and the ring 130. Thus,

even if fastener shank 110 loosens within the bone, the fastener head 102 will tend to remain within ring 130 in the hole 24 of the plate 22. There may be some freedom of movement in the connection between the prongs 126 and the groove 130 to allow a fastener 100 to back out slightly from a bone after insertion.

During the surgical procedure for attaching a bone plate to bones using the devices depicted in Figures 5-14, holes may be drilled and tapped into the bones to which the bone plate 22 is to be attached. The bone plate 22 may be positioned adjacent to the bones. Rings 130 may be positioned within each end hole 24 before or during the surgical procedure. A fastener 100, with a pre-inserted locking mechanism, may be positioned through a ring 130. An insertion/extraction tool 114 may be inserted in the opening 104 of threaded fastener 100 to compress the locking mechanism 116 within the cavity of the driver head of the tool. Compressing the locking mechanism 116 retracts the prongs 126 of the locking mechanism within the fastener opening 104. The fastener 100 may then be rotated to insert the fastener ~~100~~ into a bone. As the fastener 100 is rotated, fastener head 102 moves into the ring 130. Movement of head 102 into ring 130 causes the ring to expand against the end hole 24 to fix the fastener 100 relative to the plate 22. Once the fastener 100 is fully inserted, insertion/extraction tool 114 is removed. Removing the tool 114 causes the locking mechanism 116 to uncompress so that the prongs 126 extend through the holes 108 in the fastener head 102 and engage ~~ring~~ the groove 132 in the ring 130. Fasteners 100 may be inserted through the remaining end holes 24 and into bone to securely attach the plate 22 to the bones.

Figure 15 illustrates an embodiment of a fastener 200 with fastener head 202 having groove 204. When a fastener 200 is inserted through a ring 230 positioned in a plate 22, the groove 204 may engage fingers 232 on the ring ~~230~~ (the ring shown in Figures 19 and 20) to secure the fastener 200 within the ring ~~230~~. Fastener 200 may include the head 202 and shank 206 with threading 208. Head 202 may include opening 210 configured to accept a ~~driving~~ drive tool.

Please replace the four paragraphs beginning on page 19, line 21 with the following

amended paragraphs:

Figures 19 and 20 show perspective views of embodiments of ring 230 that may be used with fasteners having a groove. Ring 230 may include bottom 234, top 238, an outer surface 48, an inner surface 60, gap 36, and slots 240 and notches 242. The slots 240 and notches 240 may form the fingers 232. Gap 36 may allow ring 230 to contract. Contraction of the ring 230 may facilitate the insertion of the ring into an end hole 24 in a bone plate 22. Gap 36 may also allow the ring 230 to expand against the end hole 24 when a fastener head 202 passes into the ring. Expansion of the ring against the end hole 24 fixes the fastener 200 relative to the bone plate 22.

In some embodiments, outer surface 48 of the ring 230 may be textured to increase the coefficient of friction between ring 230 and the hole 24. In some embodiments, inner surface 60 of the ring 230 may be tapered to match a tapered head of a fastener 200. Having tapered surfaces may facilitate the expansion of ring in an end hole 24 during insertion of the fastener into the ~~bone plate~~spinal plating system 20.

The shape of the end hole 24 may push the fingers 232 inwards past the edge of the groove 204 of a fastener 200 when the groove is inserted into a ring 230 so that the groove passes an upper edge of the ring slots 240. The inward positioned fingers 232 may inhibit fastener 200 from backing out of the ring 230 and the end hole 24. When the fastener 200 is inserted into the ring 230, the fastener head 202 may expand the outside surface 48 of the ring against the inner surface 46 of the end hole 24 to fix the fastener 200 to the ring~~ 230~~, and the ring to the plate 22.

Figure 21 is a perspective view of an embodiment of a ring that may be used with fasteners 200 that have rims 204, such as the fasteners shown in Figure 15-17. Ring 430 may include bottom 432, top 434, outer surface 48, inner surface 60, gap 36, notches 436, and ridges 438. Notches 436 divide the ring 430 into segments or paddles 440. Notches 436 and gap 36 may allow ring 430 to contract, facilitating the insertion of the ring into ~~a~~ an end hole 24 of a bone plate 22. Notches 436 and gap 36 may also allow ring 430 to expand when a fastener head 202 passes into the ring to fix the position of the fastener relative to the bone plate 22. Notches

436 may also allow paddles 436 to bend outwards during insertion of a fastener 200. The outer surface 48 and/or the inner surface 60 may be textured. The inner surface of the ring 430 may be tapered to correspond to the taper of a fastener head 202.

C10

Please replace the two paragraphs beginning on page 21, line 15 with the following amended paragraphs:

Figure 23a, 23b, and 23c show partial cross sectional views of a threaded fastener 200, ring 430, and insertion/extraction tool 450 during the insertion and extraction processes. Referring to Figure 23a, driver head 456 of insertion/extraction tool 450 is inserted in opening 210 of fastener head 202. Ring 430 is positioned inside ~~a~~ an end hole 24 in a bone plate and the bone plate is positioned on a bone (bone and bone plate not shown). Fastener 200 is screwed into the bone until the outer surface of fastener head 202 contacts the surfaces of the paddles 440. The tapering of the outer surface of fastener head 202 provides a ramping force on the surfaces of the paddles 440, to bend the paddles outwards as fastener 200 is screwed farther into the bone.

C11

In Figure 23b, fastener 200 has been screwed in to the desired depth. Fastener head 202 penetrates ring 430 far enough to allow ridges 438 to snap onto rim 204 on fastener head 202. Driver head 456 of insertion/extraction tool 450 is shown still inserted in opening 210 prior to removal from the opening. After insertion, if the fastener 200 becomes loose within the bone, fastener backout from the bone plate may be resisted by the ridge-rim connection between fastener head 202 and ring 430. Thus, even if the fastener shank loosens within the bone, the fastener head 202 will tend to remain within ring 430 in the end hole 24 of the plate 22 so as not to protrude from the plate into surrounding body tissue. In some embodiments, there may be some freedom of movement in the connection between the ridges 438 on the paddles 440 and the rim 204 to allow a fastener 200 to back out slightly from a bone after insertion. Typically, the freedom of movement is limited so that the fastener head 202 may not protrude from the plate 22.